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## The eight challenges of the millennium?

### Part 1.

#### Emptiness is matter.

## The hypothesis of incompleteness of the principle of conservation of mass and energy

***Abstract.** This article attempts to show incompleteness of the principle of conservation of mass and energy, on the basis of assumption of the recognition of two new for the science types of substance — being of proposition and being of perception, based on the fact that emptiness is not nothingness (nothing), but «something» — type of substance. The hypothesis proceeds also from the mutual transition of different types of matter: substances, fields and spaces, into one another in strictly defined conditions. We expect the recognition of emptiness as a type of matter to have far-reaching consequences for numerous sciences. Firstly, it «legalizes» in terms of natural scientific materialism, i.e. attaches legitimacy to the ideas of mass and energy extinction. This, however, does not mean transition of something into nothing, and by expanding conservation principle, we uphold the same position that matter does not disappear, but converses from one type into another — emptiness. The recognition of emptiness by matter brings to the cardinal conclusions about the emergence of galaxies, black holes, stars and stellar substance from space (emptiness). The hypothesis of emergence of substance in the centre of galaxies receives another indirect confirmation.*

***Key words:** energy, mass, principle of conservation, matter, galaxies, emptiness, nothing, hypothesis, being of perception, being of proposition.*

**T**his article attempts to show incompleteness of the principle of conservation of mass and energy, on the basis of assumption of the recognition of two new to science types of substance — being of proposition and being of perception, based on the fact that emptiness is not nothingness (nothing), but «something» — a type of substance. During the work we intend to rely on some ideas and views

already stated by the author, the logical continuation of which brings us to the conclusion indicated in the title of the article [Asadullaev 2008, 10-20]. The hypothesis also proceeds from the mutual transition of different types of matter: substances, fields and spaces, into one another in strictly defined conditions.

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sequences for numerous sciences. Firstly, it «legalizes» in terms of natural scientific materialism, i.e. attaches legitimacy to the ideas of mass and energy extinction. This, however, does not mean transition of something into nothing, and by expanding conservation principle, we uphold the same position that matter does not disappear, but converses from one type into another — emptiness. The recognition of emptiness by matter brings us to cardinal conclusions about the emergence of galaxies, black holes, stars and stellar substances from space (emptiness). And the hypothesis of the emergence of substance in the centre of galaxies receives further indirect confirmation. (In accordance with historical and philosophical tradition, since ancient times space has meant emptiness, albeit that now space is referred to as emptiness, since it possesses protensity, dimensions, geometric properties and so on, aka it is not nothing.) Although René Descartes identifies matter and space, the approach of regarding space only as properties or forms of matter, but not as its type is preserved.

The methodological importance of this thesis is that one should not only uphold a certain principle  $E = MC^2$ , but advance in search of a more general principle of conservation not limited by the principle of conservation of mass and energy; it is necessary to include, into a future physical and mathematical formula, space as something turning into another something — a substance-field. Thus the thesis: «emptiness is matter» will supplement and clarify our views in astrophysics, physics, mathematics and philosophy. We expect that the thesis will give impetus to further explorations of absolute vacuum structure, disputing its existence before the Big Bang. As a form of matter associated with substance and the field, emptiness-space emerged at the same time.

While discussing this issue, the attention was drawn to the fact that the speed of light is the vector concept and space, in this sense, is included in the formula  $E = MC^2$ . In this regard, the author of the article suggested that included space should be taken within the aspect of structural changes that are asymmetrically adequate to mass and energy. Emptiness-space is something that changes absorbing mass and energy. Essen-

tially, the question is whether it represents by itself something as space, qualitative changes of space — emptiness that is adequate for a «disappearing» substance-field, transforming into structural changes.

It is clear that the principle of conservation of mass and energy still functions well in many cases, but there are numerous related issues in the science, not limited with its effect that require new research.

We are not talking about negation of the principle of conservation of matter but of its historical form, as a principle of conservation of mass and energy. The principle of conservation of mass and energy is just a constituent part of a more general principle of conservation of mass, energy and space (emptiness, absolute vacuum).

The principle of conservation was discovered in 1748 by M.V. Lomonosov, and in general terms formulated by Lavoisier in 1789; whatever is taken away from one body is added to another. At first, this principle was related to the conservation of matter and motion in chemical reactions and after that it came to be expressed through mass and energy equivalent to it in nuclear transformations. Running in parallel, there has been a tradition of a broader understanding of the principle of conservation of matter and motion. By matter, we mean all its forms and types: elementary particles, energy field. However, this is not completely clear in relation to the definition of the structure of matter itself.

The following judgments extend the concept of matter, including the notion of emptiness (space) as a type of matter, and not only as its attribute, form, or property. This means that mass and energy (fields) may not be conserved exactly as this type of matter, but may transform into space — absolute vacuum, and vice versa. This can be understood as the disappearance of matter or the appearance of matter from «nothing». Although in reality nothing appears from nothing and does not transform into anything. The application of new concepts — being of proposition and being of perception, leads to an expansion of the principle of conservation of matter, including such types as emptiness-space. That is, the principle should cover not only matter and motion, but also

space, into which the motion and other types of matter — substance and field, are transformed. Nowadays, physics has successfully developed the concept of absolute vacuum, but not as nothingness. We need a consistent solution to the issue in a philosophical context. This may give the returning pulse to physics, mathematics and astrophysics.

Rene Descartes identified matter and space, assuming that emptiness does not exist, but it is important for us to distinguish types of matter that transform into each other, that is something that can be raised as an issue only today. Matter and space cannot be identical due to the fact that space is a part of the matter.

In order to substantiate the ideas in the title of this article, we intend to justify the existence of philosophical categories — the being of proposition and being of perception.

At the same time, the article attempts to reconsider more than two thousand years of philosophical tradition which in its precise and convex form and patterns identifies the emptiness and nothingness (nothing), while in some cases it recognizes the existence of emptiness not as matter, but as its container, form of existence or attribute. This, to our mind, is a form of «shameful» belonging of the concept of emptiness (space) to the notion of matter, and a consequence of a «substantial» approach to the understanding of matter.

The history of philosophy has experienced other, sometimes contradictory approaches, to the concept of emptiness, but its relationship with the material being has not been recognized directly, but somehow shamefully in the form of «non-substantial», as opposed to «dense» as «substantial». Among ancient thinkers, only Leucippus and Democritus came close to understanding the single essence of «substance» and emptiness. Aristotle writes that: «A Leucippus and his follower Democritus recognize fullness and emptiness, calling one substance, and the other non-substance, namely: full and consistent — substantial, and empty, and (sparse) — the non-substantial (and therefore they state that substance exists no more than a non-substance, since a body exists no more than emptiness), and, by the material cause of existence, they mean both» [Aristotle, 1976 I, 75]. Leucippus and Democritus did not essentially consider

«density» and emptiness to be equivalents; although «body exists no more than emptiness», they acknowledged the existence of nothingness, realizing it as emptiness.

Even Hegel, being deeply aware of the substantial unity of «a thing» and emptiness, assuming that each is a dialectical negation of the other and an «existent being», nevertheless, was not entirely confident in considering emptiness as nothingness. «In terms of negation» «a thing» and emptiness are the point of the ratio of negation of the negation as the ratio of a certain alternative to a relative alternative; «a thing» is the negation in the definition of being, the emptiness — the negation in the definition of non-being» (Hegel Georg Wilhelm Friedrich. Science of Logic. Vol. 1. M.: Thought, 1970. — P. 235).

Persian-Tajik physician and philosopher, Abu Bakr Ar-Razi (the second half of IX — beginning of X century) also does not recognize emptiness as matter. The researchers for Ar-Razi's works, M. Dinorshoev and M. Mirboboev note: «It should be emphasized that Ar-Razi's thesis on place as one of eternal inception of being, is a necessary logical consequence of his concept of place as the matter container» [Abu Bakr Ar-Razi, 1990, 8]. Being of «place» is recognized, but not as matter.

The survey of the current issue at the same time expands our views on the scope of universal dimensions of reality by introducing new philosophical concepts to the scientific use, reflecting, hopefully, a new category of philosophy — being of proposition and of perception.

The thesis, laid down by the author on the basis of many years research of new philosophical categories, states that there is an infinite number of universal dimensions, laws and categories of objective reality, behind every single-unit phenomenon or object there are hidden universal laws, phenomena and categories, which are not always accessible at first sight, but should be identified within the process of learning reality. The «notorious» triad of universal dialectical laws, rooted in Hegel's works and accepted by the Soviet philosophical school, restricted entirely the possibility of a principled approach to this issue. Quantitative frame-

work of philosophical categories are usually hushed up; there has only been one rescuing phrase «and other philosophic categories». Let us try to confirm the above mentioned thesis on unrestrictedness of universal dimensions of reality once again, attracting for this purpose views of teachers of mankind, who are precursors of many modern ideas, whose brilliant insights lead us to the formulation of new problems of science.

The relationship between objects and their location had already been noticed in ancient times. Let us consider what Ibn Sina (Avicenna) writes in his book «Danishnama» in the section «Guidelines and instructions». Ibn Sina asks himself on behalf of the reader, a polemical question: «One may say: «The body cannot have either place, or state, or form emanating from its essence. On the contrary, perhaps, from the very inception of its emergence any certain body should be endowed with external factors by its Creator. The influence of these factors cannot be free, by its status and form, due to which it comes to be definite, as it is displayed in every little particle of a land, a place of which corresponds to its nature and is opposed to the place of another particle due to the factor that does not underlie in its essence, albeit this does not happen without the assistance of essence. Despite the peculiarity of its state, the body does not separate from its appropriate certain natural place, though it does not deserve this place in any absolute way. What we are talking about relates to the absolute place. The same can be said about form» [Abu Ali Ibn Sina (Avicenna) 2005 I, 690-691].

Ibn Sina's doubt (Avicenna) is contrasted with the following opinion: «As for the Creator, he designed the essence of the body during the moment of its emergence for a certain place but not any other, only on the basis of the advisability of its nature or because of special necessity or by chance». This thought reflects an exceptionally important principle in the cognition of the body (things, objects, events) in its relation to place. Essentially, this is a fundamental recognition of the substantial unity of body and space, or, as we would say today, being of proposition and being of perception. The question is not

merely about the fundamental connection between matter and space as forms of existence, this would be an absurd repetition of a well-known truth.

The question is about something else — it is about the challenge of setting the topical philosophic ideas free from an ongoing «substantial» approach to reality, both in modern materialism and other sciences. The solution of this question suggests the ideas of the incompleteness of the principle of conservation of mass and energy. The new approach is, to our mind, extremely vital for modern physics, astrophysics and other sciences. Over a thousand years matter has primarily been understood, first of all, as a substance (body, body-like, «flesh»), and emptiness as a condition for the existence of this «flesh» — matter, although at the time, Leucippus and Democritus considered atom and emptiness as the elemental and material factors of existence. Yet, as noted above, despite this they regarded atom as substance and emptiness as non-substance.

Emptiness, in many other studies, has also been recognized as being, but «shamefully» — a condition for existence of another being — matter, which is understood as substance («flesh»). Matter, as we can suppose, is understood restrictedly in the form of matter only. These are different areas of philosophical thought with a vividly expressed «substantial» approach to matter.

How should this be understood then? Let us refer to the works of the prominent thinker of the twentieth century, Werner Heisenberg. In his article: «Quantum Theory and the Origins of the Study of Atom» he writes: «Energy is the driving force. It is regarded as an ultimate cause of all changes and can be converted into matter, heat and light. The conflict of opposites, which is typical for Heraclitus's philosophy, finds its prototype hereby in the interaction of different forms of energy» [Heisenberg 1990, 35-36].

In this aspect, Lenin's definition of matter through its opposition to consciousness represents a matter of exceptional significance. We may judge Lenin's political ideas and practice, but his definition of matter represents a major achievement of modern philosophy. Lenin gave a definition of matter,

but he himself was not consistent, with an application toward space that also adhered to a «substantial» understanding of matter.

The imperfection of the «substantial» approach becomes evident in Lenin's definition of matter as an objective reality which is independent of consciousness. Under his proposed definition, matter is all that is beyond consciousness; moreover, consciousness and matter are absolutely opposed only within the fundamental question of philosophy. This means that beyond the fundamental question of philosophy the notion of consciousness is not opposed to the notion of matter and is a part of it. Matter is substance and energy, and all other infinite forms of reality, not referring to consciousness as an alleged source of matter. This is a well-known statement of modern materialism, which has fundamental significance for further studies, confirmed by the practice and development of natural science.

However, Soviet philosophic tradition undergoes some limitations concerning the approach to the understanding of matter, when space is recognized only as a form of being of matter. This is also, to some extent, the development of a «substantial» approach to matter as an objective reality. We can say that today matter is considered as being of proposition (the term means something which is incurred in, proposed, occupying a place, to place).

It is beyond doubt that space is a form of being of matter, but we should not restrict ourselves by this statement. The form itself, i.e. space, represents a certain type of matter. There is, to our mind, the being of proposition and being of perception, — the opposite manifestations and forms of matter. The concept of perception should be understood not only from an anthropological point of view, but broader, in terms of ontology, as something which is perceived as a type of matter and material. At first superficial sight, the understanding of «emptiness», space as an integral part of matter may seem absurd and paradoxical. But this follows from the consistent understanding of matter as an objective reality. The notion of being is used as identical to the notion of matter beyond the fundamental question of philosophy.

Being of proposition is all that takes a certain «place», and the notion of «place»

itself is being of perception — another type of matter. However, we should not, in turn, limit dialectics of being of proposition and being of perception only to the notion of space and what is in the space.

We act on the premise that space is not just being of perception, but is also being of perception with a sharp qualitative drop in the comparison with the «substance-field». In other words, there exist, at least two types of being of perception. One type is space as something which perceives and the other is represented by «substantial matter», that is «something» which is perceiving within the being of proposition itself. Thus being of proposition, remaining the same all the time and at the same time, becomes «something» perceived. Each «substantial matter» (substance, field, energy, etc.) may be, in various but quite definite aspects, represented both with being of proposition and being of perception.

The dialectics of pan-sexuality of the world should be seen not only as one-sided. At the human being level, for example, a woman, who makes the world a present of a baby, in her turn is being of proposition (ontologically «Yang» masculine), and a man who creates, together with the woman, living conditions for the child, accepting it into his life is, at the same time, a being of perception. As Vernadsky would say, it is a «place for existence», even though his concept refers to other biologic phenomena. Meanwhile, relationships between men and women are diverse, but the ones of their basics are universal parts of reality — proposition and perception. This serves as an argument for us to speak about the life of bisexual organisms as a unique phenomenon in nature, in which, however, universality is displayed.

In other words, it is necessary to distinguish between being of proposition, and perception in being of proposition of the universe itself, as objects, substances, energy fields that possess an ability to be not only something proposed and brought in, but also as a type of perceiving matter. Even in a simple communication with one another, one brings in and proposes, and the other perceives. The simplest interaction is not possible without these categories, since if things, while perceiving the effect of each other, did not change, there would be no inter-

action. As for the interaction — it is a universal form of being of matter. All types and forms of matter possess a capacity for effect perception. However, space is an entirely different type of perceiving matter. The «nothing» of space is always «something», regardless of whether we would call it an absolute vacuum or emptiness. Space cannot only represent nothingness by itself, as it is also the unity of nothing and something, however, in the form of being of perception.

Our approach to being as a unity of «Yang» and «Yin» is not something exceptionally new. In the intellectual history of mankind — the mythology and philosophy of ancient times were familiar with the ideas of enmity and love as the creative forces of reality, or if we take for instance, ancient Chinese mythology and natural philosophy, with their ideas of masculine and feminine being — yang and yin. This serves as evidence of the universalism of human cognition, reflecting the universality of objective reality. Universalism, underlying the relationship between a man and a woman, affected the creative activity of the prominent poet and thinker Jaloliddin Rumi, who wrote the following lines:

*Осмон марду замин зан дар хирад,  
Хар чи он мекорад, ин мепарварад.*

*Suppose if a man is sky  
and a woman is earth,  
What the man sows the woman grows.*

However, at the dawn of philosophy it was Pythagoreans who long before Jaloliddin Rumi (whose 800-year anniversary was celebrated in 2007), mentioned masculine and feminine principles alongside other principles of being, and this is what Aristotle indicates [Aristotle, 1976 I, 76].

The important thing for us in this regard, is not the revival, but the understanding of the most original and earliest ideas of mankind in the context of modern materialism; this is now freed from the mythology, poetic metaphors, and breaking free from the heritage of a «substantial» approach to the concept of matter. In this regard, it was Lenin who made a fundamental step, introducing his defini-

tion of matter as an objective reality. However, the heritage of the Soviet philosophic tradition limits the ability of understanding space by not considering it as a peculiar type of matter itself, a being of proposition opposite to other forms and types of space.

From this perspective, the «substantial matter and field» — matter itself is a form of existence of space as being of perception — are two types, two forms that do not exist apart. Here a question arises about the nature of time and motion (the other aspects of the continuum of Einstein), but it requires a special consideration.

Besides, after introducing such notions as being of proposition and being of perception into the scientific usage there appears a new dimension to the study of objective reality at the present level of scientific knowledge, and other aspects of the interconnection of the history of philosophy, contemporary philosophy and other sciences. The recognition of the categories of being of proposition and being of perception, and understanding of space as a type of matter consistently brings us to a hypothesis of the incompleteness of the mass and energy conservation principle.

The interconnection of body and «place», which is found in works of Aristotle and Ibn Sina, is showed by the concept of continuum in contemporary physics (Lorentz and Einstein) on a completely different level, under which substance, energy, space and time, represent a fundamental unity. However, it is necessary to take into account the structural and qualitative changes of emptiness (space, absolute vacuum) into which equal transformation of substance and field is possible.

From our point of view, the introduction of the notions of being of proposition and being of perception expand our insights of matter, space and the dialectics by new dimensions. This is in the way of consistent understanding of Lenin's definition of matter as an objective reality, which claims to understand space not only as a form of being of matter, but as a certain type of matter itself. From this perspective, the universe's space is exceptionally peculiar by its quality as being of perception, and all of what is in it — being of proposition. The whole world together with the galaxies and metagal-

axies, including the entire enlarging universe as being of proposition, finds itself in an expanding «container» with which it is inseparably linked. In addition, if we take into account that the universe expands and the density of matter in it reduces to zero, one should, using a common anthropologic approach to this understanding, speak about a kind of weakening of its masculine. But at the same time, an intensification of being of proposition takes place in the mankind evolution which creates a second nature — culture in the broadest sense of the word. A man in proposition contributes his own culture to the world.

And at the same time, humanity is a kind of growing being of perception in many directions. As an example we take the process of the infinite study of the universe, starting from the direct environment of a human being up to its visible limits, which is not restricted by a time scope. The principle feature of being of proposition and being of perception, which can be supposed as «proposition — substantial matter» and «perception — space-matter», is relative resistance and conservation of their structures in such conditions where they essentially cannot exist apart. However, this has little to do with microcosm.

It should also be noted that space as a type of being of perception differs strikingly from another type — various representations of «substantial matter» as being of perception. Due to this, more and more questions arise, the answers to which, as we can expect, increase our knowledge. The absolute vacuum or «empty» space, which as we know is not «empty» to our mind, gets filled with a deep philosophical meaning. Being of proposition and being of perception do not exist without each other. In this regard, it should be noted that even though absolute vacuum cannot exist apart from matter and energy fields, at the same time, it is not reduced to them, it is characterized by an independent «something».

In addition, the problem acquires supplementary philosophical grounds in connection with the emerging aspects of the transformation of space as being of proposition into being of perception — another form, namely into a form of «substance-field», an infinite world of various types of «bodies» (atom, human kind, planets,

etc.). This means that within the framework of specificity of space itself as a being of perception, there should exist or be generated other forms of being of proposition just exactly in the form of space since something happens within the framework of specificity of being of proposition — «substance field» which at the same time becomes being of perception. Within its specificity and quality, space experiences the alterations that we can identify as being of proposition of space itself which is beyond substance and field. Thus, the transformation of space as being of proposition into being of perception represents not only qualitative changes of space, but generation of a substance-field by space.

Within the context of the problem defined, the issue of the emergence of substance out of nothing comes to be seen differently. The transformation of «nothing» into something is indeed the transformation of one «something» into another «something»: the emergence of being of proposition («substance-field) out of space (being of perception or «perceptive matter»); one type of matter causes another type of matter. If the space is being of perception that means it is not «nothing», but something. And this something causes another something. As far as we can judge, our presented approach clarifies many confusing questions about the emergence of matter from nothing that perhaps do not occur, despite the claims of some philosophers and astrophysicists about the emergence of matter in «empty-nothing» space. However, in reality, one type of matter causes another type of matter: space, matter and field mutually generate each other. The illusion of «emergence of matter out of nothing» and «transformation of matter into nothingness» is developing, as we consider, a special importance both for quantum theory and astrophysics. This is a cardinally different dimension of the laws of interaction and mutual transformation of being of proposition and perception — «the substance-field» and space, «body» and its «place» speaking the language of pillar teachers. Each of them represents the essence of matter.

The great discovery in 1748 by outstanding Russian thinker and scholar, Mikhail Lomonosov on conservation law has had an extremely unexpected continuation and acquired new aspects. His theory runs that what-

ever is taken away from one body is added to another. It is extremely interesting to question the way space, as being of perception, becomes being of proposition, not only as a «substance-field», and remains space.

This approach puts an end to the ancient intellectual traditions that divided the concept of matter and space, despite «shameful» recognition of the notion of space belonging to the notion of matter, although not considering «emptiness» or vacuum as a type of matter. In other words, emptiness was not included in the concept of matter as one of its types, but only as a «medium» of matter or attributive characteristic of matter. In modern materialism, space is still defined as an attribute of matter. An attribute is a necessary, substantial, integral property of an object — matter in our case. However, according to this view, this is not matter itself or one of its types, but only its property, even though an essential one.

There is, to our opinion, a cardinal difference between the understanding of space as a property of matter and understanding of space («emptiness», «place», absolute vacuum) as a type of matter itself. The question of being of proposition and being of perception is of methodological importance for further development of philosophy, physics, astrophysics and other sciences. All the same, the aspect under dispute may provide an impetus for further scientific exploration and research, particularly for in-depth study of the emergence of stars and galaxies out of emptiness, large-scale transformation of space into the same large-scale cosmic being of proposition — «substance-field» (galaxies, stars, black holes, interstellar «matter»), and vice versa.

In this regard, the questions of the nature and fundamental properties of emptiness — space — as a type of matter transforming into a «substance-field» — in another type of it, come into existence. Relying upon everything mentioned above, it should be noted that nothing is dual and in a way representative of something not being determined by the definitions of our being — of our Universe. The Recognition of multiplicity of Universes gives us a clue of the idea that has been stated many times by scientists, about the enormous qualitative differences under the transition from one Universe to another.

There is an infinite number of universal aspects of reality. Every single phenomenon in our case, represented by the relationships between men and women, conceals universality of the universe. The concepts of masculine «yang» and feminine «yin», the recognition of the existence of categories of being of proposition and being of perception expand and deepen the principle of conservation of matter.

The principle of conservation takes another form, and most probably, a new physical and mathematical form. We are firmly certain of the existence of such types of matter as being of proposition and being of perception. These categories supply the hypothesis of large-scale reciprocal transformations of space, matter and field with information. They «assume» the emergence of galaxies, stars, black holes and elementary particles, in a «non-traditional way», however, as we reiterate, in strictly defined, regular conditions. It is necessary to display the way the hypothesis and other facts supporting the conservation principle in the prior form fit into each other.

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